II Year II Semester	**L**	**T**	**P**	**C**
Code: 17CE403	**3**	**1**	**0**	**3**

CONCRETE TECHNOLOGY

Course Learning Objectives:

1. To learn the concepts of Concrete production and its behaviour in various environments.
2. To learn the test procedures for the determination of properties of concrete.
3. To understand durability properties of concrete in various environments.

Course Outcomes:

Upon successful completion of this course, student can able to

1. Understand the basic concepts of concrete, Realise the importance of quality of concrete.
2. Familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.
3. Test the fresh concrete properties and the hardened concrete properties.
4. Evaluate the ingredients of concrete through lab test results.
5. Design the concrete mix by BIS method, Familiarize the basic concepts of special concrete and their production and applications.
6. Understand the behaviour of concrete in various environments.

SYLLABUS

UNIT I

Ingredients of Concrete Cements & Admixtures:

Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and Chemical Admixtures – Accelerators, Retarders, Air Entertainers, Plasticizers, Super Plasticizers, Fly Ash and Silica Fume.

Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size. Quality of mixing water.

UNIT II:

Fresh Concrete:

Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability –Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete

UNIT III:

Hardened Concrete:

Water / Cement ratio – Abram's Law – Gel space ratio –Nature of strength of concrete –Maturity concept – Strength in tension & compression –Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength– Flexure tests –Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT IV:

Elasticity, Creep & Shrinkage:

Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep – Shrinkage –types of shrinkage.

UNIT V:

Mix Design:

Factors in the choice of mix proportions – Durability of concrete –Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts Proportioning of concrete mixes by various methods – BIS method of mix design.

UNIT VI:

Special Concretes:

Ready mixed concrete, Light weight aggregate concrete, Cellular concrete, No-fines concrete, High density concrete, Fibre reinforced concrete, Different types of fibers, Factors affecting properties of F.R.C, Polymer concrete, Types of Polymer concrete, Properties of polymer concrete, High performance concrete –Self consolidating concrete, SIFCON, self healing concrete.

TEXT BOOKS:

1. Concrete Technology by M. S. Shetty. – S. Chand & Company
2. Concrete Technology by A. R. Santha Kumar, Oxford University Press, New Delhi.

REFERENCES:

1. Properties of Concrete by A. M. Neville – Pearson – 4th edition
2. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	3	3	3	3	2	2	2	3	3	3	3	3
CO2	3	3	3	3	3	3	3	2	3	3	2	3	3	2	3
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CO6	3	3	3	3	3	3	3	2	3	3	3	3	3	1	3